

$$f(-x) - af(x) = 2|x| + 1 \quad (2) \quad (1)$$

$$x \rightarrow f(-x) - af(x) = 2|x| + 1 \xrightarrow{x \rightarrow -x} af(-x) - a^2 f(x) = 2|x| + 1$$

$$-x \rightarrow f(x) + af(-x) = 2|x| + 1$$

$$\Rightarrow (1+a^2)f(x) = (2|x|+1)(1-x) \Rightarrow f(x) = \frac{(2|x|+1)(1-x)}{1+x^2}$$

$$f(x) + f(0) = x^2 - 3x + 3 \xrightarrow{x=0} f(0) = 3 \rightarrow f(0) = 3 \quad (2)$$

$$f(x) = x^2 - 3x + 3 \xrightarrow{x=x^2} x^2 - 3x^2 + 3$$

$$y = \frac{x^2 + x + 2}{x - 1} \rightarrow yx - y = x^2 + x + 2 \rightarrow x^2 + (1-y)x + y + 2 = 0 \quad (2)$$

$$(1-y)^2 - 4(y+2) = 0 \Rightarrow (y-5)(y+1) = 0$$

$$\frac{-1}{+} \quad \frac{5}{-} \quad \frac{1}{+} \quad (-\infty, -1] \cup [5, +\infty)$$

$$(الف) \quad 2x^2 \leq ax + 1 \quad \frac{-b}{2a} = \frac{a}{2} \xrightarrow{x=\frac{a}{2}} \frac{-1}{\Delta} \quad (2)$$

$$2\left(\frac{a}{2}\right)^2 - a\left(\frac{a}{2}\right) + 1 = \frac{2a}{\Delta} - \frac{2a}{2} + \frac{1}{\Delta} =$$

$$R = \left[-\frac{1}{\Delta}, +\infty\right)$$

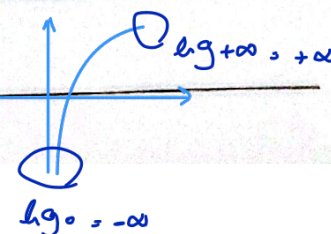
$$ب) \quad y = \sqrt{-x^2 + 4x - 2} \quad \frac{-b}{2a} = 2 \quad y = \sqrt{(-\infty, 2]} \rightarrow [0, 2] \quad (2)$$

$$ج) \quad y = \sqrt{x^4 - 3x^2 + 5x + 1} \rightarrow R = [0, +\infty)$$

$$د) \quad y = \log(x^4 - 3x^2 + 5x + 1)$$

$$x^4 - 3x^2 + 5x + 1 \rightarrow \mathbb{R}$$

$$R = \mathbb{R}$$



$$د) \quad \log \mathbb{R} = \log(0, +\infty) = (-\infty, +\infty) \quad \text{جلوی نظایتم همیشه مثبت!}$$

② a) i) $y = \frac{rx+1}{x-1} \quad |R - \{\frac{1}{r}\}$

(2)

→ $y = \frac{rx+1}{x-1} \rightarrow \sqrt{R - \{1\}} \rightarrow [0, +\infty) - \{1\}$

ii) $y = \frac{rx+r}{\sqrt{rx+r}} = \frac{rx+r+1}{\sqrt{rx+r}} = \frac{rx+r}{\sqrt{rx+r}} + \frac{1}{\sqrt{rx+r}} = \sqrt{rx+r} + \frac{1}{\sqrt{rx+r}}$

$R \equiv [\sqrt{r} + \frac{1}{\sqrt{r}}, +\infty)$

→ $rx + \frac{1}{rx+r} \rightarrow R = [\frac{1}{r}, +\infty)$

④

(2)

$y = \frac{rx+r}{rx-1} \rightarrow yrx - y = rx+r$

⑤ ol

$x(y-r) = y+r \quad rx = \frac{y+r}{y-r} \quad x = \pm \sqrt{\frac{y+r}{y-r}}$

$R = (-\infty, -r) \cup (r, +\infty)$

$\frac{-r}{+r} \quad \frac{r}{+r}$

⑥ $x_{max} = \infty \rightarrow y = r \quad x_{min} = 0 \rightarrow y = -r$

$R = (-\infty, -r) \cup (r, +\infty)$

⑦ $f(x) = \frac{r \sin x + r}{\sin x - r}$

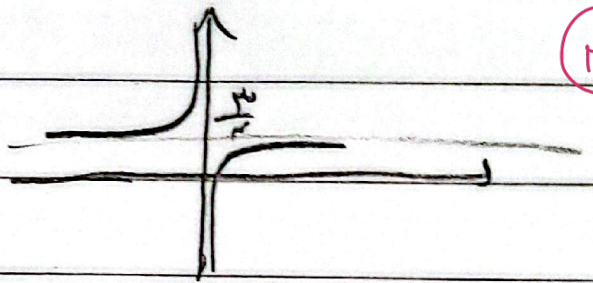
(2)

$\max \rightarrow \frac{r}{-r} = -1$

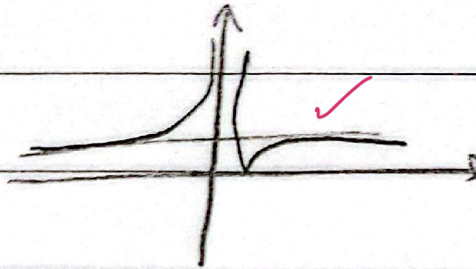
$\min \rightarrow \frac{r}{-r} = -1$

$R = [-r, \frac{1}{r}]$

① $y = \left| \frac{x^2-1}{x} \right|$ میانگ افقی = $\frac{3}{2}$ میانگ عمودی = 0 (۲)



|| →



$R = [0, +\infty)$

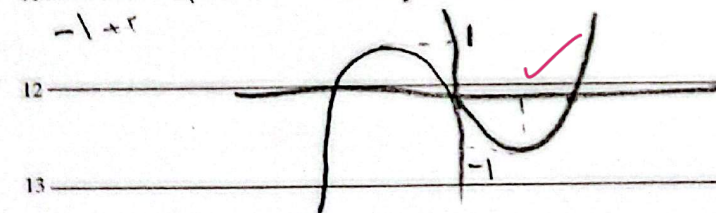
۱) $y = \sqrt{\frac{9x-11}{-1+x}}$ محدوده تعریف: $\sqrt{\frac{9}{x}}$ → $\frac{3}{x}$ $R = \left\{ \frac{11}{9} \right\}$

⑨ $y = x|x| - 2x$ (۲)

$x < 0$ $0 < x < 2$ $x > 2$

$-x^2 - 2x$ $x^2 - 2x$ $x^2 - 2x$

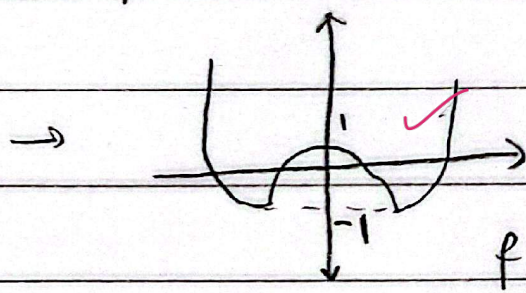
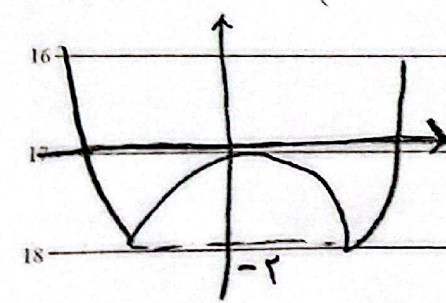
$\frac{-2}{-1+x}$



$\begin{cases} x^2 - 2x & x > 0 \\ -x^2 - 2x & x < 0 \end{cases}$

$R = \mathbb{R}$

⑩ $y = |f(|x|) + 1|$ (۲)



$f(|x|) + 1$

